

THE MOTOR COMPLICATIONS OF HERPES ZOSTER.

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THE eruption of herpes zoster, which consists of vesicles upon inflamed bases, is characterized mainly by its limitation to the portion of skin that is supplied by the affected spinal ganglia. Head¹ distinguishes two forms of zoster. The first is merely a symptom of some more general nervous disease and it is called, therefore, symptomatic zoster. The second is a disease *sui generis* and has been termed acute specific zoster. This latter is characterized by the presence of fever, together with the general symptoms of an acute infection, by a self-limited course, by the tendency to occur in epidemics, and finally by the fact that one attack confers upon the patient a relative immunity to future attacks. These data serve to place this form of zoster among the acute infectious diseases. Anatomically it is characterized by an acute hemorrhagic inflammation of the posterior, sensory, nerve-root ganglia.

As might be expected, the motor lesions associated with symptomatic zoster are numerous and varied. For example, in myelitis the skin supplied from the upper level of the lesion may be the seat of a zoster. In spinal caries zoster may occur at the level of the gibbus; zoster is not an infrequent symptom of tabes dorsalis and of dementia paralytica²; it may accompany hemiplegia³; and finally it may follow tumors or traumata of the central nervous system. It is sometimes very difficult to determine whether the primary lesion has actually caused the zoster or whether it has merely opened the portals for an attack of the acute specific form of the disease. In some cases, however, the two forms of the disease are easily distinguishable. For example, when the zoster recurs repeatedly, or when it exhibits a bilateral distribution, we may exclude with some probability the specific form of the disease; for only very rarely is this either bilateral or recurrent. As an example of the association of paralysis with symptomatic zoster, I may cite a case that came under my observation at the New York Hospital.

Case I. A young man, on diving into shallow water, struck his head with considerable force. He stated that he did not become unconscious immediately but that he was simply unable to move either his arms or his legs. In this condition he sank, became unconscious, and was only rescued after being in the water for about five minutes. When he regained consciousness about twenty minutes later, he could move his legs but his arms were completely paralyzed. After 30 minutes more the power began to return to his arms. The next day, when he was admitted to the hospital, his arms were still very weak and were not under complete voluntary control. On each arm, between the elbow and the shoulder, was an area over which the sensations of pain and temperature were lost while the tactile sensation was unimpaired. Three days after the injury, a bilateral cervical zoster appeared, involving the skin distribution of the third and fourth cervical segments. This healed rapidly, the patient regained control over his arms, the sensory disturbances gradually cleared up, and he left the hospital ten days later practically well. The nature of the accident, the sudden onset of the paralysis, the dissociated loss of cutaneous sensation, the favorable outcome, all favor the diagnosis of a hemorrhage into the cervical cord. The zoster was of the symptomatic type, for it followed the injury directly and it was bilateral.

We now turn to the consideration of the motor disturbances that may be associated with the specific form of zoster. *A priori* it would seem very probable that an inflammation of the sensory ganglion might spread from there to the nerve itself and that the involvement of the motor fibers might lead to a paralysis of the muscles supplied by the affected nerve. As a matter of fact, however, very few cases have been reported which would fall in this category. Yet we must remember the great frequency with which zoster affects the trunk, about 76 per cent of Head's cases¹. The paralysis of a single motor nerve in this region is not easily recognized and quite possibly it occurs far more frequently than a study of the litera-

ture would lead us to believe. I have been able to find only one case reported in which the muscles of the trunk were paralyzed after a zoster. This patient¹² was a woman, sixty years old, in whom a lumbar zoster was followed by a paralysis of the abdominal muscles on the same side.

Next in frequency to the body zoster come those of the face and neck, which will be discussed later. Finally, rarest of all, come the zoster that affect the extremities. If we take into account the rarity of these, it would seem that motor complications are here relatively common. I have references to some eleven cases which belong with more or less certainty to this class^{4, 5, 6, 7, 8, 9, 10, 11}. For example, Walter's¹¹ patient, a man fifty years old, was attacked with zoster of the right arm and eight days later with a paralysis that apparently involved the circumflex and musculo-cutaneous nerves. Hardy's⁹ first patient had zoster along the course of the sciatic nerve which lasted some twenty days with remissions and which was followed a month later by a complete atrophic paralysis of the muscles of the calves and of the outside of the leg. Joffrey's⁷ Case I showed an atrophic paralysis of the small muscles of the hands subsequent to a zoster of the shoulder. Other cases placed in this class are of a more doubtful nature. Thus Ebstein¹ questions the paralysis in the cases reported by Broadbent⁴ and Handfield Jones⁸; Schwimmer's¹⁰ patient developed his symptoms after an injury to the shoulder and the zoster may have been of the symptomatic type; while the abstracts of Magnus' and Hartmann's cases that are available to me are not sufficiently complete to allow me to classify them accurately.

Herpes about the face and neck is more frequently associated with paralysis than is herpes of any other part of the body. These paralyzes are of especial interest for the reason that the motor nerves affected do not coincide with the sensory nerves. These paralyzes may be divided into (1) ocular paralyzes subsequent to herpes zoster ophthalmicus, (2) facial paralysis following herpes of some division of the fifth nerve, (3) facial paralysis preceding herpes zoster of the fifth nerve, and (4) facial paralysis as a sequel to zoster of the neck.

The first of these, the ocular paralyzes, have been thoroughly discussed by the oculists^{13, 14} and it is therefore unnecessary to attempt an exhaustive discussion of this subject. According to Wecker (cit. in¹⁴), ocular paralyzes of some sort complicate about seven per cent of all cases of zoster ophthalmicus. The most frequent of these paralyzes are those affecting the third cranial or oculomotor nerve. This nerve may be paralyzed in its entirety or in any of its component parts. Thus the internal ocular muscles may be paralyzed alone; or the external muscles supplied by this nerve may be paralyzed, or the levator palpebrae may be alone affected, etc. Paralysis of the sixth cranial nerve, the abducens, is more uncommon; while rarest of all the ocular paralyzes are those that affect the fourth or trochlear nerve.

The second of the above groups comprises those cases in which a facial paralysis follows a herpes zoster of some portion of the skin supplied by the fifth nerve. I have been able to collect twelve such cases from the literature. The general history of these is as follows: herpes zoster of some division of the fifth nerve, usually the first, followed within a few hours to a few weeks by a paralysis more or less complete of the seventh nerve on the same side of the face. In Murphy's²² case and in Caspar's¹⁶ case, the paralysis affected the facial nerve on the opposite side of the face. In Truffi's²³ case the second and third divisions of the fifth nerve were affected, in Tay's²² case the first and second divisions. In Montgomery's²⁰ case, the facial paralysis that followed an herpes ophthalmicus, involved only the uppermost fibers of the seventh nerve, i. e., those supplying the right frontalis muscle.

The third group comprises those cases in which the facial paralysis precedes the facial zoster instead of following it. Four such are on record^{25 26 27 28}. One of these²⁵, however, followed a severe injury to the skull, probably a fracture, and should therefore be classed rather with the symptomatic zoster. In Eichhorst's²⁵ case, the most typical one of this group, the herpes appeared four days after the facial paralysis and involved the lower half of the right ear, the external auditory canal, and the right side of the tongue and hard palate. The sense of taste and the movements of the uvula were not affected. In Tryde's Case III²⁷, the herpes did not appear until three months after the paralysis and it was limited to the distribution of the first division of the fifth nerve. In Remak's case²⁸, the herpes appeared only on the anterior two-thirds of the tongue on the affected side.

Finally we come to the most frequent form of facial paralysis associated with herpes zoster; viz., paralysis of the seventh nerve after a zoster of the cervical region on the same side. I have recently seen two such cases and as they are fairly typical of the group I shall first report these.

Case II. Mr. S., 65 years old, was referred to me by Dr. Geo. B. Somers. On March 24, 1905, the patient had suffered from slight pain in the left shoulder. On the 27th, the skin of the left side of the neck had burned uncomfortably and examination then showed it to be red, swollen, and of a boggy consistency. At the same time, the neighboring lymphatic glands became swollen and the patient had some fever. Two days later, on the 29th, vesicles appeared on the red spots and the neuralgic pains became more severe, extending to the top of the head, to the left ear, the left shoulder, etc. The skin over the affected area had now become hyperesthetic to the touch. On April 3d, about seven days after the appearance of the red spots, the patient noticed that his left eye did not close so well as his right, and on the 5th of April, two days later, this paralysis had become definite and had extended to the muscles of the mouth. The herpetic eruption healed with some scarring but most severe neuralgic pains continued to harass the patient. These extended over the left back of the head and the whole of the left side of the neck, and were so severe that the patient could not sleep.

Physical examination on April 14th showed a pale, nervous, and rather thin patient with a left-sided facial paralysis. The left forehead and left mouth were completely immobile but the left upper eyelid could be closed slightly. No loss of taste, hearing normal, palate symmetrical. Electrical examination: facial muscles will contract when the nerve is stimulated either by the galvanic or the faradic current, though the muscles about the mouth do not respond so readily as do those about the eye. All the muscles are irritable to direct stimulation either by the faradic or galvanic currents but those on the left side are more irritable to direct galvanic stimulation than are those on the right side of the face. The cathodal closing contraction is stronger than the anodal closing contraction. Scars of the previous herpetic eruption are plainly visible on the left side of the neck and these with the hyperesthesia of the skin correspond to the distribution of the second, third, and fourth cervical segments. Enlarged cervical glands can be felt above the left clavicle.

The facial paralysis improved gradually but even now, ten months later, it has not entirely disappeared. The neuralgic pains also persisted for a long time.

Case III. A. G., an Irish woman, 60 years old, was admitted to the medical service of Dr. J. O. Hirschfelder, at the City and County Hospital, in July, 1905. Family and past history negative. Uses alcohol and coffee moderately. About one week before admission patient noticed a painful reddened area over the left side of the neck, extending down to and over the clavicle. She attributes this to some kerosene that she had dropped into her ear about a week before for buzzing in the ear. Two days after the redness appeared on the neck the skin began to turn a darker color and to peel off. She does not recollect any vesicles on the neck, but is very uncertain about the details of her illness. On the third day after the onset of the rash patient found that the left corner of the mouth did not move properly, and that the left eye troubled her.

Physical examination on July 28th showed a well nourished but pale woman with negative physical findings except for her face and neck. The left side of the face is completely paralysed, the forehead being smooth, the lower lid everted, the mouth motionless. Taste is completely lost over the anterior portion of the left side of the tongue. Hearing is equally poor in both ears. Ear drums negative. Palate at times appeared symmetrical, at other times the right side seemed higher than the left and the uvula seemed to be deflected to the right. The left side of the neck is covered with a series of reddish scars, to some of which crusts are still clinging. The skin over this area is intensely hyperesthetic; the least touch causing the patient pain. The distribution of this hyperesthesia (see

Fig. 1) corresponds to the distribution of the second, third and fourth cervical segments. Patient is troubled with severe neuralgic pains in the left neck, and at times she has parasthesias, such as the sensation of pins and needles. Electrical examination: All the muscles contract when the facial nerve is stimulated, either by the galvanic or by the faradic current. A much smaller current is necessary to cause a contraction when the left facial nerve is stimulated (0.3 milliamperes for the C. C. C.) than when the right facial nerve is stimulated (0.7 milliamperes for the C. C. C.). On direct stimulation of the muscle the cathodal closing contraction is stronger than the anodal closing contraction. The contractions are much slower on the diseased than on the healthy side.

The facial paralysis gradually improved. On August 18th she could close the left eye voluntarily. On August 29th she wrinkled the forehead and closed the eye almost as well on diseased as on the healthy side; the muscles about the mouth could also be moved slightly, but taste was still defective. On October 17th taste had returned and the patient could move all her facial muscles; but those on the left side, especially about the mouth, were decidedly paretic and showed a tendency to contracture. When she was discharged, December 11th, she had improved somewhat more in the use of her face, but the paralysis was still noticeable. Throughout her stay in the hospital she was tortured with severe neuralgic pains about the left neck, and had a hyperesthesia of the skin in this region, so severe that she protected the affected skin even from the touch of her clothing. For her pains and hyperesthesia a great variety of remedies were tried, but none afforded so much relief as the freezing with ethyl chloride, that has been recommended by Morrow. The pains and the hyperesthesia were still troublesome when she left the hospital.



Illustration of case reported.

In addition to these two cases of facial paralysis following zoster of the neck, I have been able to find 23 similar ones in the literature. The condition therefore is not particularly rare. Head observed one such case in a series of 412 zoster cases of which about 40 were cervical zoster. Greenough²⁹ observed one such case among 255 zoster cases of all kinds, but he also observed one case not included in this series. Of the histories and abstracts at my disposal, twenty, including my own, are sufficiently full to permit tabulation as to age, sex, distribution, etc.

The results of this tabulation may be summed up as follows: The ages of the patients varied from 17 to 75 years, the average being 48 years. This is in marked contrast to the average of all zoster cases, for

the latter are most frequent among young individuals, Head stating that the maximum incidence in his cases lay between 12 and 13 years and that over 70 per cent were under 20 years. This further illustrates the fact that herpes zoster is a far more serious disease in elderly people, for not only are the neuralgias more severe but motor complications are more liable to occur. So far as sex is concerned there seemed to be a slight preponderance of the female sex. In nine patients the left side was said to be affected, in ten the right. The location of the zoster is variously described, but in the main it seems to have occupied very much the same position as it did in my cases. In several patients it appears to have involved the face as well. The paralysis appeared in from one to fourteen days after the zoster, the average being about six days. The extent of the paralysis varied greatly; from one in which only the upper facial muscles were paralysed and the lower only slightly paretic, to others in which all the muscles were paralysed with a complete reaction of degeneration and the uvula and taste were affected. The duration of the paralysis was equally variable; for in one patient it disappeared in four days while in others it had not disappeared after months.

The cause of the motor paralyses that may accompany herpes zoster is by no means clear. We have already mentioned the possibility that the inflammation might spread from the diseased ganglion to the main nerve trunk and there affect the motor fibers with a consequent paralysis of the muscles supplied by this nerve. Yet this explanation hardly holds for the cases where a cervical zoster is followed by a facial paralysis. Two main theories have been advanced to explain such cases. According to the first the disease is comparable to a multiple neuritis and the facial nerve falls a victim to the poison on account of some special susceptibility. If this theory were correct, we should expect the facial nerve on the opposite side from the zoster to be affected just as frequently as is that on the same side. Yet such is not the case; for in all of the cervical zoster cases here collected the paralysis and the zoster were on the same side of the body. This explanation therefore seems highly improbable. According to the second theory, the inflammation spreads from the cervical ganglia along the cervical nerves, then from their anastomoses on to the terminations of the seventh nerve, and finally it travels up the seventh nerve and paralyzes it. Cumbersome as this hypothesis is, it appears to be the most satisfactory that has been advanced thus far. One might consider, in addition, the possibility that the zoster of the neck caused a swelling of the tissues—e. g., glands, periosteum—about the ear, and that in this manner a pressure paralysis of the facial nerve resulted. Yet in some cases at least, the loss of taste locates the lesion within the petrous portion of the temporal bone; and, so far as I know, we possess no evidence that the cervical plexus supplies the structures within this bone.

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